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piece (cylinder, sphere or Bellani plate) is filled with distilled water and the tube is set into the porcelain piece, with the rubber stopper pressed firmly into the neck. The tube is next completely filled with distilled water, by pouring from the reservoir bottle (previously filled), and then it and the porcelain piece together are quickly inverted and the free end of the tube is inserted into the reservoir in the usual manner, the second stopper closing the reservoir.

With the arrangement here described water does not pass downward through the valve, but it readily passes upward, keeping the evaporating surface supplied. This mounting appears to operate perfectly, just as well as do the more complicated forms, it is more easily installed than they, it is easily constructed and the materials are inexpensive and readily obtainable.

BURTON E. LIVINGSTON,  
FRANK THONE

THE JOHNS HOPKINS UNIVERSITY

### THE IOWA ACADEMY OF SCIENCE

THE thirty-fourth annual session of the Iowa Academy of Science was held in Physics Hall of the State University at Iowa City on April 23 and 24. At the opening session on Friday afternoon, the twenty-third, the memorial portrait of the late Dr. Samuel Calvin, formerly head of the department of geology at the state university and state geologist, was unveiled and presented by the Academy to the State Historical Department at Des Moines. President Stephens then delivered his address on "The Taxonomic Unit."

After the reading of papers the academy adjourned to see the moving pictures showing the University Barbados-Antigua Expedition of 1918 and also those showing the development of the potato disease known as "Leak" by the fungus *Pythium DeBaryanum*. Owing to the fulness of the program it was necessary to hold a short session after the group dinners, following which President Jessup, of the university, and Mrs. Jessup received the visiting members at their home.

Section meetings were held on Saturday forenoon and at the succeeding business session the following officers were chosen for the coming year: *President*, Nicholas Knight, Cornell College, Mount

Vernon; *First Vice-president*, D. W. Morehouse, Drake University, Des Moines; *Second Vice-president*, R. B. Wylie, State University, Iowa City; *Secretary*, James H. Lees, Iowa Geological Survey, Des Moines; *Treasurer*, A. O. Thomas, State University, Iowa City.

The academy ratified the action of its executive committee in accepting affiliation with the American Association for the Advancement of Science, which action had been taken soon after the meeting of the association in St. Louis. The constitution was amended to provide for the collection of dues of the association by the treasurer of the academy at the same time as the academy dues, and also to provide for the beginning of the fiscal year on October 1. Also an amendment was passed providing for the selection by the academy of a representative on the council of the American Association for the Advancement of Science.

The Iowa sections of the American Chemical Society and the Mathematical Association of America held their meetings in conjunction with the academy.

### TITLES OF PAPERS

#### Botany

*The treatment of certain seed-carried diseases*: GUY WEST WILSON.

This paper deals with work on cotton diseases conducted by the author and associates at the South Carolina Experiment Station. Cotton anthracnose is the most important disease of field crops in the southeastern states, comparing favorably with the wheat rust in the Mississippi valley. The author and his associates have perfected a method of treating the seed which is practicable on a commercial scale and which bids fair to be of considerable value in the treatment of seed carried diseases of other crops.

*Some noteworthy uredinales and ustilaginales*: GUY WEST WILSON.

*Notes on apogamous Ligulifloræ*: RAYMOND A. FRENCH.

*Some aspects of the plant ecology of certain Kansas sand hills*: FRED W. EMERSON.

The sand hills studied lie in south-central Kansas along Arkansas river between Wichita and Hutchinson. Dense vegetation holds the sand stable wherever man permits; burning, close grazing and attempts to plant farm crops have removed natural vegetation from considerable areas not only making them useless but threatening neighboring farm lands with being covered with

blowing sand. All degrees of reclamation by invading vegetation are found. The types and characteristics of the plants are noted and short lists of the more important plants found at the various stages are given.

*Notes on some Rocky Mountain plants, chiefly of the Arapahoe mountains:* L. H. PAMMEL AND R. I. CRATTY.

*Further notes on the germination of some trees and shrubs and their juvenile forms:* L. H. PAMMEL AND CHARLOTTE M. KING.

*On the occurrence of the giant puff ball:* HARRY M. KELLY.

*The disintegration of certain intracellular bodies:* CLIFFORD H. FARR.

*The teaching of plant pathology:* W. H. DAVIS.

*Plant tumors:* HENRY ALBERT.

*The vegetation of Cape Blanco:* MORTON E. PECK.

*The major vegetation of Lake Okoboji:* ROBERT B. WYLIE.

*Some Alaska fungi:* J. P. ANDERSON.

*The genus Ceanothus in Iowa:* B. SHIMEK.

*Quercus lyrata Walter in Iowa:* B. SHIMEK.

*Seasonal variations in their relation to ecological field observations:* B. SHIMEK.

*Notes on the distribution of midsummer bee plants in the Mississippi zone of Clayton county:* ADA HAYDEN.

*The growth of foliage leaves:* BERYL TAYLOR.

*Comparison of the absorption occurring in corn stalk tissue and in prepared bicolloids:* L. E. YOCUM AND A. L. BAKKE.

*Mechanical preparation of sweet corn pericarp:* R. A. RUDNICK AND A. L. BAKKE.

*The Orchidaceae of Nebraska:* T. J. FITZPATRICK.

*The influence of forest areas in non-forest regions upon evaporation, soil moisture and movement of ground water:* I. BODE.

The paper includes the results of a series of studies carried on in the northeastern part of Iowa during the summer of 1919. The work covers a comparison of the evaporation and soil moisture conditions obtaining on forested and non-forested sites, and the influence that forested areas have as to the checking of runoff, the absorption of moisture in the soil and the response of various soils at various depths to precipitation. The results and conclusions bring out some very interesting facts relative to the economic values of forest areas of a state like Iowa in conserving soil mois-

ture, checking evaporation and regulating the flow of smaller streams throughout the state.

#### Chemistry

*Simplified electrotitration and its use in determining the iodine ion:* W. S. HENDRIXSON.

*An examination of rain and snow precipitations:* J. E. TRIESCHMANN AND NICHOLAS KNIGHT.

The precipitations covering a period of 8½ months, from October 1, 1918, to June 15, 1919, were examined. The samples were collected in granite pans 20 inches in diameter, on an open spot near the center of the village of Mount Vernon, Iowa. The nitrogen in the free and albuminoid ammonia, nitrates and nitrites was determined. Most of the winter precipitations contained sulphates, probably resulting from the combustion of coal. A few analyses showed a trace of phosphate. All the rain and snow contains a constant amount of chlorine, probably carried in the winds from the Atlantic.

*An apparatus for determining solubilities up to the critical temperature:* P. A. BOND.

*The nitration of halogenated phenols:* L. CHARLES RAIFORD.

*Vacuum tube circuits as a source of power for conductivity measurements:* H. A. GEAUQUE.

*The free energy of dilution and the activity of the ions of sodium bromide:* J. N. PEARRE AND H. B. HART.

#### Geology

*Iowa terranes compared with those of adjoining states:* CHARLES KEYES.

Since geologic phenomena are not restricted by political boundaries many of the missing leaves of Iowa's earth-history are found clearly imprinted in contiguous states. But it is difficult to make very close comparisons because of the diverse conditions and the varied aims under which the terranal schemes are constructed. By reducing to a standard the geological sections of our state and those of surrounding states a classificatory plan is effected which, although perfectly elastic, permits exact stratigraphic parallelism to be instituted.

*Belated survival of Wernerian nomenclature:* CHARLES KEYES.

Galena as denominating a notable Ordovician dolomite is not a geographic name, as is so often supposed. James Hall, who proposed the term, derived it directly from the chief mineral content of the formation. In using the title this author manifestly modified Featherstonough's earlier name

"Galeniferous Limestone," which in turn was an alteration of Schoolcraft's usage of "Metalliferous Limestone."

*Rectification of Iowa's Cambrian section:* CHARLES KEYES.

Recent critical inspection of the type localities of the Cambrian formations of the upper Mississippi basin indicates that there are grave misinterpretations of stratigraphic succession. Thus, some well-known formational titles become synonyms and pass out of use; several names are new; and a number of substitutions appear. Exact parallelism of the upper Mississippi Basin section and that of the Ozarks is thus satisfactorily permitted.

*The use of the terms flint and chert:* W. S. GLOCK.

Common usage of these terms may leave such an uncertainty that a word dare not be employed where scientific accuracy is desired. For example, it is a common habit to call any form of quartz interbedded with iron ore "chert" for want of knowledge of the nature of the quartz and of the meaning of the term employed. Detailed reference to the standard English and American textbooks on geology and mineralogy substantiates the confusion which exists and which is presented therein for the instruction of the reader. Neither chert nor flint should be a provoking "catch-all"; fundamentally they are good terms whose use is justified only where exactness is implied.

*The fauna of the Independence Shale:* A. O. THOMAS.

This interesting fauna, first reported by Dr. Calvin over forty years ago from a very limited exposure, has recently become better known due to the discovery of several fossiliferous outcrops of the shale as reported before the academy a year ago. Among the additions to the fauna is a species of the crinoid *Arthracantha*, hitherto known only from the Devonian of the region of Lake Ontario. There is also a species of *Spirifer* akin to *S. disjunctus*, a new *Chonetes*, and a fine specimen of *Hypothyridina cuboides*. A few of the species of the Independence shale recur in the Lime Creek shale at the top of the Iowa Devonian but none of the forms just mentioned are known to occur in the later formation.

*Nortonechinus, a Devonian sea urchin:* A. O. THOMAS.

This is a highly specialized genus known only from dissociated plates, spines, and parts of the lantern. The test of the living animal was doubtless very flexible and was well protected by the

covering afforded by the broadly expanded distal ends of the spines as in modern *Colobocentrotus*. Two other genera of echinoids also found in the Lime Creek shales will be briefly discussed.

*The corals of the Hopkinton stage, Iowa Silurian:* A. O. THOMAS AND BERYL TAYLOR.

The Iowa Silurian affords a rich and interesting assemblage of corals most of which are highly silicified. The Calvin Collections from the typical localities together with those made by various field classes and by the writers, furnish a large series in which some of the genera are very well represented. *Strombodes*, for example, has no less than ten species, *Favosites*, seven, *Zaphrentis*, six, and *Heliolites*, four. The reefs furnish upwards of seventy species, many of which are new.

*The conservation of underground water:* JAMES H. LEES.

The paper discusses the importance of water, its source and distribution, its relation to the rock strata and its use by plants. The need for better conservation is emphasized and the effect of population increase and of agriculture is discussed.

*Certain post-Pliocene deposits in Missouri:* B. SHIMEK.

*On the occurrence of charcoal in an interglacial peat bed in Union county:* RALPH W. CHANEY.

*A sink hole in northeast Iowa:* E. J. CABLE.

*A note on the progress of investigation of the Iowan-Wisconsin border:* E. J. CABLE.

*A field of eskers in Iowa:* JOHN E. SMITH.

*The content of agricultural geology:* JOHN E. SMITH.

*The Palisades of the Cedar:* WM. H. NORTON.

*A comparison of the Nebraskan drift with the Kansan drift:* GEORGE F. KAY.

#### Physics

*The Hall effect and the specific resistance of thin silver films:* G. R. WAIT.

*The dependence of the resistance of silver films upon the method of deposition:* G. R. WAIT.

*On the dynamics of an airplane loop:* L. P. SIEG.

*A new high frequency tone generator:* C. W. HEWLETT.

*The perception of binaural phase difference not caused by an intensity effect:* G. W. STEWART.

*The frequency limits of the binaural phase difference and intensity effects:* G. W. STEWART.

*Note on the principle of similitude:* I. MAIZLISH.

*A table of the total number of stroboscopic velocity curves for any of the natural numbers from 1 to 500 inclusive taken as a limiting value of  $n$  and  $m$ :* L. E. DODD.

*On finding the equation of the characteristic blackening curve of a photographic plate:* P. S. HELMICK.

*The overtones of air columns:* L. B. SPINNEY.

*The stereoscope in teaching physics and geometry:* LEROY D. WELD.

The stereoscope has usually been considered a mere toy. In this paper, however, is given a method whereby stereoscopic drawings of any simple figure in space can be easily prepared and duplicated for use in the study of any subject requiring three-dimensional figures, such as solid geometry, crystal structure, analytic mechanics, optics, etc.

#### Psychology

*Symposium: Some Results of Current Research in the Psychological Laboratory of the State University. Introduced by C. E. Seashore.*

*The talent survey in our music school:* ESTHER ALLEN GAW.

*The Iowa pitch range audiometer:* C. C. BUNCH.

*The normal curve of acuity in hearing:* PAUL B. ANDERSON.

*The localization of sound by wave phase in the open ear:* HENRY M. HALVERSON.

*What constitutes voice:* CARL I. ERICKSON.

*The application of the Mendelian law to talent in music:* HAZEL M. STANTON.

*The personal equation in motor capacities:* MARTIN L. REYMERT.

*Serial action as a basic measure of motor capacities:* C. F. HANSEN.

*The measurement of motility in children:* LILLIAN TOW.

*The selection of talent for stenography and typing:* B. W. ROBINSON.

*A measure of capacity for acquiring skill in co-ordination of eye and hand:* WILHELMINE KOERTH.

*A standardized measure of motility:* MERRILL J. REAM.

#### Zoology

*Some Iowa records of Lepidoptera:* A. W. LINDSEY.

*A biological reconnaissance of Okefinokee swamp, Georgia. The fishes:* E. L. PALMER AND A. H. WRIGHT.

The Okefinokee swamp in its fish fauna is decidedly fluviatile. Like that of Florida its fish fauna may be held to have "originated from the north and is thus not tropical." The swamp has twenty-three less fresh water species than the whole state of Florida and in number of forms is not comparable to the better known Everglades of Florida. Twenty-eight species are known from the swamp and twenty-two of these are included in the collection upon which this paper is based. Sixty-three specimens of the rare *Lucania ommata* (Jordan) were taken. The southern limit of the range of *Umbra limi* (Kirtland) is increased from North Carolina to southern Georgia. In addition the material supports contentions that *Umbra pygmaea* DeKay is a synonym of *Umbra limi* (Kirtland); *Esox vermiculatus* Le Sueur, of *Esox americanus* (Gmelin.); *Enneacanthus gloriosus* (Holbrook), of *Enneacanthus obesus* Baird; and *Copelandellus quiescens* (Jordan), of *Boleichthys fusiformis* Girard.

*Bird records of the season 1919-1920 in the vicinity of Iowa City:* DAYTON STONER.

*Cladocera of the Okoboji and Spirit Lake regions:* FRANK A. STROMSTEN.

*Copepoda of the Okoboji region:* FRANK A. STROMSTEN.

*Rotatoria of the Okoboji region:* DWIGHT C. ENSIGN.

*Similarities between the lateral-line systems of elasmobranchs and amphibians:* H. W. NORRIS.

Naked neuromasts in amphibians correspond to pit-organs and canal-organs in the elasmobranch fishes. The mandibular series of neuromasts of amphibians is distinctly double, oral, and gular. Similarly in elasmobranchs the mandibular and hyomandibular canal organs correspond to the oral series and a mandibular row of pit-organs to the gular series of neuromasts of amphibians. The vaguely defined occipital group of neuromasts of amphibians corresponds to the sense-organ of the supratemporal canal. Three lines of neuromasts occur on the trunk of the body in amphibians, innervated by three distinct nerve rami. Three series of lateral-line organs are to be found on the trunk in elasmobranchs.

*Susceptible and resistant phases of the dividing sea-urchin egg when subjected to various concentrations of lipid-soluble substances, especially the higher alcohols:* FRANCIS MARSH BALDWIN.

When subjected to suitable concentrations of various lipid-soluble substances the developing sea-urchin egg shows unmistakable rhythms of sus-

ceptible and resistant phases, which fact constitutes additional evidence that a very intimate relation exists between the general physiological condition of the egg, and the physical state of its plasma-membrane. During the first ten to fifteen minutes after fertilization the eggs are more susceptible to all substances tried than at any other time until the period just preceding and during the division process. A period of marked increased susceptibility occurs during the division process which outlasts the furrow formation in most cases about ten to fifteen minutes, and during this interval, marked cytological effects in the eggs are noted. The best records were obtained using i-amyl and capryl alcohols, possibly indicating a higher specific toxicity of these men when compared to the others.

*Notes on the branches of the aorta (Arcus aortae) and the subclavian artery of the rabbit:* FRANCIS MARSH BALDWIN.

Although the usual number of blood vessels arising from the arch of the aorta in the rabbit is two—a so-called innominate or brachio-cephalic artery and a left subclavian artery—the variations from this condition indicate the possibility of a considerable departure. In a number of cases, three vessels have their origin on the arch and in these the order is the brachio-cephalic, the left common carotid and the left subclavian arteries. Conspicuous differences in the order and sequence of the vessels from the subclavian arteries of the two sides are noted. On the left side the vessels in a number of cases show a tendency to group themselves either proximally or distally in the form of a sort of corona.

*A study of the phylogeny of certain hymenopterous parasites of leafhoppers:* F. A. FENTON.

This paper deals with the *Anteoninae* (*Dryinidae*), a small parasitic group now classed with the *Bethylidae* under the *Proctotrupoidea*. We are now able to trace the evolution of the peculiarly specialized species from the more simple and generalized types. So far as our present knowledge is concerned these insects are parasitic on the leaf- and tree-hoppers and there is an interesting relationship in the evolution of these parasites with their homopterous hosts. The larvæ are mostly externally attached to the host and are incased and protected in the larval exuviae which form a protective sac. The fore tarsi of the adult parasites in a great many cases are modified into perfect chelæ or clasping organs, a fact not found in any other insect group.

*The relative position of the maxima contractions of the Amphibian muscle when subjected to various ranges in temperature:* RALPH L. PARKER.

The results of a series of twenty experiments upon the gastrocnemius muscles of frogs showed three apparent maxima contractions within the range of plus ten degrees Centigrade through zero degrees to rigor caloris. These varied to some extent as to what degree the maxima fell, depending upon the individual. Rigor caloris of the muscles generally proximated that of the greatest maxima, while that when all were combined and averaged was less than the greatest maxima. Selecting those which recorded in all ranges of temperature and averaging them (seven) the results were nearly parallel to the average of all the muscles and only two maxima contractions appeared. Rigor caloris was greater than the maximum contraction.

*A revision of the Cercopidae of North America north of Mexico:* E. D. BALL.

The family Cercopidae is the smallest and best known of all the groups of the Homoptera. The writer's key to the genera and species of the family published over twenty years ago is now out of date. A number of changes in synonymy and distribution have been made and several species and varieties added and the whole information brought up to date.

*A review of the desert leafhoppers of the Orgerini (Rhynchota fulgoridae):* E. D. BALL AND ALBERT HARTZELL.

These desert leafhoppers are a group of round, fat, short-winged insects with very peculiar structural modifications probably developed to adapt them to the extremely hot conditions of the deserts. These modifications consist in an elongation of the rostrum or beak and a lengthening of the legs so that the insect walks upright and its body is thus removed from close contact with the hot sands.

These insects are all inhabitants of the arid regions west of the Rockies and are little known. A number of new genera and species are proposed, together with the classification and life histories of the group.

*Notes on some dipterous parasites of leafhoppers:* I. L. RESSLER.

Two new species of Pipunculidae, of the genus *Pipunculus*, reared from the nymph of the leafhopper *Deltocephalus sayi* Fitch are described and discussed in this paper. The Pipunculidae are small flies about one eighth of an inch long, the head being larger than the thorax, and consisting chiefly of the large, closely approximated eyes.

While it is known that the larvæ of these flies are parasitic in their habits, very little is known of their host relations.

*An intensive ornithological survey of a typical square mile of cultivated prairie:* ARTHUR R. ABEL.

*Bird records of the past two winters, 1918-1920, in the upper Missouri valley:* T. C. STEPHENS.

*A study of sociality in the phylum Coelenterata:* H. J. WEHMAN AND GERTRUDE VAN WAGENEN.

*On the parasites of the unios of the Lake Okoboji region:* HARRY M. KELLY.

*The 1919 outbreak of armyworms and variegated cutworms in Iowa:* H. E. JAKES.

*The pathology of lethargic encephalitis:* HENRIETTA CALHOUN.

*Descriptive notes concerning the American bald eagle:* BEN HUR WILSON.

*Some impressions obtained from a review of Professor Nutting's narrative of the Barbados-Antigua expedition:* A. C. TROWBRIDGE.

#### Archeology

*The material for a study of Iowa archeology:* CHARLES REUBEN KEYES.

*The Keokuk type of stone ax:* CHARLES REUBEN KEYES.

#### General

*The comparative stability of colors in wallpaper:* J. M. LINDLY.

*Iowa Section Mathematical Association of America Note on a generalization of a theorem of Baire:* E. W. CHITTENDEN.

A celebrated theorem of Baire states that the necessary and sufficient condition that a function  $F(x)$  defined on a closed set  $P$  in space of  $n$ -dimensions be the limit of a sequence of continuous functions defined on  $P$  is that if  $Q$  be a perfect subset of  $P$ , then  $F(x)$  has a point of continuity in every portion, however small, of the set  $Q$ . Professor Chittenden calls attention to the fact that a proof of this theorem given by Vallée-Poussin can be extended without difficulty to the case of a set  $P$  in an abstract space of a type studied by Fréchet. As a special instance,  $P$  may be a perfect set in a compact space of infinitely many dimensions.

*Notes on the history of indeterminate equations:* R. B. MCCLENON.

Professor McClenon traces the history of some indeterminate equations found in the writings of Leonardo of Pisa, showing the contributions that

had been made to their solution by the Hindus and Arabs, as well as their further development by later writers, down to modern times.

*A pseudo velocity-resistance graph for low angle firing:* M. E. GRABER.

Mayevski's law for air resistance is unsatisfactory because the discontinuities introduced render numerical integration difficult. Professor Graber presents a smooth curve law for the velocity-resistance relation between the velocities of 750 ft./sec. and 1700 ft./sec. and compares it with a pseudo velocity-resistance standardization curve.

*What is number?* C. W. WESTER.

An attempt to state in a simple way some of the outstanding differences between current definitions of number, especially between what may be called the mathematical and the metaphysical definitions; and to suggest the lines along which a working agreement may be reached as to what shall be thought of as number in elementary mathematics.

*The teaching of limits in the high school:* J. V. MCKELVEY.

In this paper Professor McKelvey discusses certain popular misconceptions in regard to limits and outlines a point of view from which a rigorous and usable understanding of this seemingly bewildering subject may be obtained. No plea is made either for or against the teaching of limits in preparatory schools.

*The taxonomy of algebraic surfaces:* R. P. BAKER.  
*The integration of the indefinite integral in the first course:* W. H. WILSON.

*A problem in summation of series:* JOHN F. REILLY.

*A geometric construction for the regular 17-gon:*  
LINN SMITH. JAMES H. LEES,  
Secretary

DES MOINES, IA.

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## SCIENCE

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